

The variations of *Alphitonia ponderosa* (Rhamnaceae)  
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*Alphitonia ponderosa* Hbd. was a tree highly esteemed by the Hawaiian people. Its wood is dark red, hard, strong, durable, and so heavy that it sinks in water. They used it in many ways, and especially to make hut beams, kapa beaters, spears, javelins, and the o'o or digging stick for spading cultivated fields. These uses are related by Degener (1930: 204, pl. 56).

The tree is semixerophytic, occurring in the lower dry forest or scrub on the leeward side of all the principal Hawaiian Islands. A number of the other denizens of these dry habitats are among the most widely distributed of the Hawaiian species, occurring as the same species on each of the principal islands. Among these are:

*Heteropogon contortus* (L.) Beauv. ex R. & S., *Panicum torridum* Gaud., *Argemone glauca* Pope, *Capparis sandwichiana* DC., var. *Zoharyi* Deg. & Deg., *Osteomeles anthyllidifolia* (Sm.) Lindl., *Cassia Gaudichaudii* H. & A., *Gossypium tomentosum* Nutt. in Seem., *Plumbago zeylanica* L., *Solanum Nelsoni* Dunal in A. DC., *Canthium odoratum* (Forst. f.) Seem. Each of these occurs as a homogeneous species throughout its range, thus not showing island endemism.

Until now there has been no suggestion that there was variation evident in *Alphitonia ponderosa*. On Oahu it is rare and local in the Waianae Mountains. Recent good collections from there have induced the writer to study and revise this species. He finds numerous small differences in vesture, leaves, flowers, and fruit, and these are correlated with their occurrence on the several islands. No single character is a strong, positive one of major significance. Hence, these differences are judged to be ones indicative of a varietal status.

*A. ponderosa* was described by Hillebrand (1888: 81-82), and he recorded it from Kauai,

Oahu, Molokai, Maui, and Hawaii, without designating a type. His herbarium was finally placed in the Berlin Herbarium, but was there destroyed in 1944. Some duplicates from his herbarium were distributed, but it is not known how many there were of this species. There is one at Kew, but its data include merely Sandwich Islands. Fortunately, in the Bishop Museum there are two sheets with good flowering specimens, and one bears the data Molokai. In the diagnosis this was listed as "Molokai! Maunaloa;". This Molokai specimen in the Bishop Museum is here selected as the lectotype for the species.

There is a world monograph of the genus by Braid (1926: 168-186), and he maintains the Hawaiian species as distinct, though most previous botanists had merged it with A. excelsa Reissek ex Endl., described from Australia, but subsequently thought to occur from Borneo to Polynesia. Braid restricted A. excelsa to Australia, and described three other Australian species, and recognized as endemics the species of the various Pacific archipelagos.

Key to Varieties of *Alphitonia ponderosa*

- A. Hypanthium in fruit 10-ribbed; blades 6-12 cm long, acuminate, below with veinlet reticulation flush, and secondaries glabrous on the backs; calyx lobes 2 mm long.  
Oahu. 3. var. costata.
- A. Hypanthium in fruit smooth,
  - B. Blade veinlet reticulation elevated on lower side,
    - C. Calyx lobes 1.3 mm wide; petioles downy; blades 6-10 cm long, acute or subacuminate.  
Lanai. 6. var. lanaiensis.
    - C. Calyx lobes 1.3-1.8 mm wide; petioles pilosulous,
      - D. Calyx lobes 1.7-1.8 mm wide; blades 4-11 cm long, acute or subacuminate, the midrib and secondaries below pilose; blades 4-11 cm long.  
Maui. 2. var. auwahiensis.

D. Calyx lobes 1.3-1.5 mm wide; midrib and secondaries below glabrous on the backs; blades 5-7 cm long, obtuse or subacute.

Molokai. 1. var. ponderosa.

B. Blade veinlet reticulation flush below,

E. Midrib and secondaries below pilose; calyx lobes 2-2.2 mm long; blades (8-) 10-20 cm long, acuminate. Kauai. 4. var. grandifolia.

E. Midrib and secondaries below glabrous on the backs; calyx lobes 1.8 mm long; blades 5-15 cm long, subacuminate.

Hawaii. 5. var. Kauila.

Alphitonia ponderosa Hbd., Fl. Haw. Is. 81-82, 1888; Drake, Ill. Fl. Ins. Mar. Pacif. 6: 140, 1890; Heller, Minn. Bot. Stud. 1: 849-850, 1897; Skottsberg, Göteborg. Bot. Trädg., Meddel. 2: 245, 1926; 15: 396, 1944; Fagerlund & Mitchell, Hawaii Natl. Park, Nat. Hist. Bull. 9: 45, 1949; Neal, In Gardens of Hawaii, Bishop Mus., Spec. Publ. 50: 541, 1965.

A. excelsa Reissek, in part, as to Hawaiian plants, sensu Mann, Am. Acad. Arts Sci., Proc. 7: 161-162, 1867; sensu Wawra, Flora 56: 176, 1873 (and in reprint p. 57); sensu Sinclair, Indig. Fl. Haw. Is., pl. 25, 1885; sensu Rock, Indig. Trees Haw. Is. 285, 287, pl. 112, 1913.

#### 1. var. ponderosa

Diagnosis of Lectotype: Blades 5-7 cm long, obtuse or subacute, midrib and secondaries below glabrous on the backs, the veinlet reticulum elevated; petioles pilosulous; calyx lobes 1.3-1.5 mm wide, 1.4-1.7 mm long; hypanthium in fruit smooth.

Lectotype: Hawaiian Islands, Molokai Island, Maunaloa, W. Hillebrand (BISH).

In the Bishop Museum, there are only three other collections of it: Kawela Gulch, 1912, C. N. Forbes 182.Mo.; Kamolo, 1910, Faurie 297; and ravine n. w. of Puu Makaliilii, 1928, O. Degener & H. Wiebke 3,343.

Maunaloa is on the low, dry, west end, and

the other three are on the lower, leeward slopes of the central part of the island.

2. var. *auwahiensis* var. nov.

Illustration: Rock, Indig. Trees Haw. Is. pl. 112, 1913.

Diagnosis Holotypi: Laminis 4-11 cm longis acutis vel subacuminatis, midnervo et nervis secundariis infra pilosis, reticulis venularum infra elevatis, petiolis pilosulis, lobis calycis 1.7-1.8 mm latis, 1.7 mm longis, hypanthio in fructu laevi.

Diagnosis of Holotype: Blades 4-11 cm long, acute or subacuminate, the midrib and secondaries below pilose, the veinlet reticulum elevated below; petioles pilosulous; calyx lobes 1.7-1.8 mm wide, 1.7 mm long; hypanthium in fruit smooth.

Holotypus: Hawaiian Islands, Maui Island, Auwahi, 3,000 ft alt., June 30, 1972, H. St. John 26,873 (BISH).

In the Bishop Museum there are 10 other specimens of this variety from east Maui, all from the Auwahi region on the lee side of Haleakala.

3. var. *costata* var. nov.

Diagnosis Holotypi: Laminis 6-12 cm longis acuminatis, midnervo et nervis secundariis infra in dorsis glabris, reticulis venularum infra complanatis, petiolis pilosulis vel glabratis, lobis calycis 1.5-1.8 mm latis 2 mm longis, hypanthio in fructu 10-costato.

Diagnosis of Holotype: Blades 6-12 cm long, acuminate; midrib and secondaries below glabrous on their backs, the veinlet reticulum flush; petioles pilosulous to glabrate; calyx lobes 1.5-1.8 mm wide, 2 mm long; hypanthium in fruit 10-ribbed.

Holotypus: Hawaiian Islands, Oahu Island, Makua Valley, V-shaped gulch against backbone, among Metrosideros, Dodonaea, Diospyros, etc., 1,600 ft alt., Nov. 28, 1976, John Obata 76-305 (BISH).

In the Bishop Museum there are 5 other collections of this variety, all from the Waianae Mts. One is from Pohakea Pass, but the others are all

from the dry slopes of Mt. Kaala, in Makua, Makaleha, and Mokuleia Valleys.

4. var. *grandifolia*, var. nov.

Illustrations: Sinclair, F., Indig. Fl.

Haw. Is. pl. 25, 1885.

Diagnosis Holotypi: Laminis (8-) 10-20 cm longis acuminatis, midnervo et nervis secundariis infra pilosis, reticulis venularum infra complanatis, petiolis pubentibus vel glabratis, lobis calycis 1.7 mm latis 2-2.2 mm longis, hypanthio in fructu laevi.

Diagnosis of Holotype: Blades (8-) 10-20 cm long, acuminate; midrib and secondary veins below pilose, the veinlet reticulum flush below; petioles downy or glabrate; calyx lobes 1.7 mm wide, 2-2.2 mm long; hypanthium in fruit smooth.

Holotypus: Hawaiian Islands, Kauai Island, Kokee Park, upper Waimea Canyon, 2 miles s. of Park Headquarters, moderately dry forest, 3,000 ft alt., July 10, 1966, S. Carlquist 1,956 (BISH).

Also in the Bishop Museum there are 27 additional specimens of this variety, all from Kauai. The variety ranges from Kokee to Kaholuamano, and the Hii Mountains.

5. var. *Kauila* var. nov.

Illustration: Degener, Pl. Hawaii Natl. Park, pl. 56, 1930.

Diagnosis Holotypi: Laminis 5-15 cm longis subacuminatis, midnervo et nervis secundariis infra in dorsis glabris, reticulis venularum infra complanatis, petiolis pilosulis, lobis calycis 1.5-1.7 mm latis 1.8 mm longis, hypanthio in fructu laevi.

Diagnosis of Holotype: Blades 5-15 cm long, subacuminate, the midrib and secondaries below glabrous on the backs, the veinlet reticulum flush; petioles pilosulous; calyx lobes 1.5-1.7 mm wide, 1.8 mm long; hypanthium in fruit smooth.

Holotypus: Hawaiian Islands, Hawaii Island, between Puuwaawaa and Huehue, Aug. 18, 1926, O. Degener 3,344 (BISH).

In the Bishop Museum there are 37 other sheets of this variety. It is abundant in the

Puuwaawaa region, North Kona District, and occurs from there south to the region of South Point, then northeast to Kilauea.

6. var. *lanaiensis*, var. nov.

Diagnosis Holotypi: Laminis 6-10 cm longis acutis vel subacuminatis, midnervo et nervis secundariis infra pilosis, reticulis venularum infra elevatis, petiolis pubentibus, lobis calycis 1.3 mm latis 1.5-1.6 mm longis, hypanthio in fructu laevi.

Diagnosis of Holotype: Blades 6-10 cm long, acute or subacuminate, the midrib and secondaries below pilose, the veinlet reticulum elevated; petioles downy; calyx lobes 1.3 mm wide, 1.5-1.6 mm long; hypanthium in fruit smooth.

Holotypus: Hawaiian Islands, Lanai Island, Maunalei, flowering 10/11/13, fruiting 2/24/15, G. C. Munro 472 (BISH).

In the Bishop Museum there are 13 other collections of this variety from Lanai. The range is at middle altitudes, encircling the uplands.

Literature Cited

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- Hillebrand, William. 1888. Flora of the Hawaiian Islands, I-XCVI, 1-673. Heidelberg, C. Winter.